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tracts, leaving minor points to be worked out by each country for itself. A commission was therefore appointed with altered and somewhat wider powers. Its functions will more fully shape themselves at the congress in Philadelphia.

The report upon the map of Europe was presented to the congress by Dr. W. Hauchecorne. This stated the progress which is being made. Four or five sheets of Central Europe will be ready for publication during the next two years; and it has been decided to publish the sheets as completed, each with its own title and index, instead of waiting for the completion of the whole of Europe, as was at first intended.

Very little time was given to the map in the public sessions of the congress; but the map commission had three long sittings, the results of which will be printed in the official report. The most important points arrived at were the adoption of the term 'pleistocene' for the index of the map (the German term '*quartär*' to be bracketed with this); the separation of the modern deposits from the pleistocene, and the mapping of the latter wherever practicable, the underlying formations (where known) to be distinguished by colored lines; in modern eruptive rocks (those of volcanoes now active or only recently extinct) the stratified volcanic tuffs are to be distinguished from the cinders and the scoriæ.

M. Karpinski has been the representative of Russia on the map commission. On this occasion he was not present, his place being taken by MM. Nikitin and Tschernicheff. The latter submitted an important note on the crystalline schists of the Ural Mountains, which would have enlivened the discussion upon this question in the public meetings of the congress. He states that the crystalline schists of the Urals contain limestones with a distinct Hercynian fauna, and also that the schists pass horizontally into Devonian strata. It is probable that in cases of this kind (and similar cases elsewhere were referred to in the public discussion) the schists will be represented by the color denoting their presumed age, while their present lithological character will be denoted by colored lines. M. Nikitin raised a point which is important in many parts of Europe, but which is especially so in Russia; that is, the necessity of distinguishing transition-beds. He instanced the Volgian beds, which link the Jurassic with the cretaceous; the Tartarian, between the Permian and the trias; and others, spoken of by M. Nikitin as Permo-carboniferous, which link the Permian to the carboniferous. These transition-beds occupy immense areas in Russia, and cannot well be fitted into the existing classification.

The discussion on the crystalline schists occupied the whole of the sitting on Wednesday, and part of that on Friday. The material for this discussion had been provided by a collection of papers printed in advance and distributed at the opening. A number of these papers were contributed by five officers of the United States Geological Survey, with an introduction by Major Powell; and by Mr. Lawson, of the Geological Survey of Canada.

In the foregoing notes we have not attempted to summarize the discussions. We have preferred to devote the space at our disposal to a general survey of the meeting, and to note some points of importance which could not well be included in a formal report of daily proceedings. The discussions may by some be held to have led to no definite result, inasmuch as no vote was taken, and therefore no formal decision of the congress can in future be appealed to. But the great value of such meetings lies in the opportunity afforded for personal discussion, and the interchange of opinions, not only in the public sessions, but in the more easy and informal conversations over the exhibits in the museum, in the corridors and reading-room, and at the friendly and social gatherings which made so pleasant a feature of the London meeting. We have no doubt that the general result of this meeting on geological opinion and progress will be at least as good as that of any which has gone before.

THE DEVELOPMENT OF THE CULTURE OF NORTH-WEST AMERICA.

It is well known that the Indian tribes of the north-west coast of America far excel their neighbors in their arts and industries. This phenomenon is of great interest, and well-deserving a thorough study. What was the origin of this culture? Which

among the numerous tribes of this region proved of an intellect so superior to that of all their neighbors? Is it possible to trace the unwritten history of this culture? All these questions are of interest to the historian, as well as to the ethnologist who tries to solve the psychologic laws of human development.

The north-west coast of America is inhabited by tribes belonging to a great number of linguistic stocks,—the Tlingit and Haida, the Tsimshian, the Kwakiutl, the Nutka, and the Salish. The physique of the northern tribes reminds us of the Japanese. The Kwakiutl are characterized by a comparatively long skull; the Salish, by an exceedingly short one. Our knowledge of the physique of these tribes is too imperfect to trace their genealogy. We may, however, trace their history by studying their customs and languages. It seems that the languages enumerated above represent as many different linguistic stocks, so far as our limited knowledge tends to show. Regarding the logical basis of grammar, we may distinguish three groups: the first comprising the Salish, Kwakiutl, and Nutka; the second, the Tsimshian; the third, the Tlingit and Haida. The formation of words and the grammatical inflection in the first group are effected by means of affixes and reduplication. The languages distinguish between sexes and between present and absent objects. What we call the adverb is the inflected part in their sentences. The second group is characterized by its entirely verbal character, nouns and verbs—if we may use these terms—being treated in the same way. There is no grammatic gender; but the past, present, and future tenses, as well as presence and absence, are distinguished. The plural has the same peculiarity as that found by Major Powell in several Shoshone dialects, different stems being used for singular and plural. The third group, the Tlingit and Haida, is characterized by the lack of inflected forms, juxtaposition of stems being the principle of grammatic structure and of the formation of words. These languages might almost be considered as belonging to the class of isolating languages.

These are the principal facts which we have to bear in mind in studying the culture of these tribes.

The best basis for ethnological comparisons are collections of specimens and collections of myths. The latter are the best clew to the religious ideas of a people, and reveal many remarkable customs which would escape the notice of the casual observer. A full account of the customs of these tribes is not yet available, as no scientific traveller has devoted sufficient time to their study.

The legends of these tribes are of a comparatively uniform character all over the north-west coast of America. This fact is not surprising, as the customs of all the tribes are very much alike. A careful analysis, however, shows important points of difference. It is true that the same elements occur over and over again, in varying combinations; but this phenomenon will not mislead the student, as it is one of the characteristics of myths, that in course of time they are developed by the addition of well-known elements. When we try to separate these elements from the legends, a series of myths remain which we are unable to trace to a common source.

As regards the elements common to all these traditions, their gradual distribution may be traced in studying, for instance, the legend of the 'Visit to Heaven,' which is known all over North-West America. The legend is one of the most important in the mythology of all Salish tribes, the tale being that men and animals made a chain of arrows reaching from heaven to earth, climbed it, and killed the sun. We find this same idea of the ascent to heaven incidentally used among the Tsimshian, only for the purpose of embellishing one of their legends. On the other hand, the tales of the adventures of the raven, which form the basis of the Tlingit mythology, are known on Puget Sound, where they form incidents in certain other myths.

Historical legends prove the correctness of our view that well-known elements of traditions are added to tales, and that their development is exclusively in this line. The Sitka Indians, for instance, have numerous legends referring to the administration of Baranoff. All of them have the same style that may be observed in their myths. Therefore, in studying the mythologies of these tribes, we must assume that each was in the possession of a certain stock of legends, which they carried to the coast. Whether these

originated among the respective tribes, or whether they were influenced by their former neighbors, it is impossible to decide. In course of time a common civilization of the coast tribes developed, and at the same time the exchange of legends began. Certain elements which had reference to their common mode of living must have spread most rapidly. Thus the basis of many legends is the late arrival of the salmon and other fish, and consequent starvation, or accidents to hunters and sealers. Just as frequently mention is made of persons who were believed to be possessed by evil spirits, and who were left alone to starve. Most of these elements are so widespread and of so frequent occurrence, that no theory as to their origin is possible.

Setting aside this point, the legends may be arranged in a number of groups which approximately correspond to the linguistic divisions.

The legends of the Tlingit are principally known through the researches of Vemiaminoff and Krause; those of the Haida, through Dawson. They may be considered as identical, as the existing discrepancies are not greater than variants obtained from several individuals of the same tribe. In both peoples the raven legend is the basis of their systems of mythology, and in both of them the interesting struggle between the Raven and his uncle occurs.

The legends of the Tsimshian contain several elements foreign to the first group. The study of their myths leaves the impression that they originally worshipped the heaven, and that stars, trees, and animals were the mediators between heaven and men. Sun and moon were deities or mediators of great power. Mixed with this idea we find the raven legend, and everywhere we notice the endeavors to give each, the raven and the heaven, its proper importance in the system of myths. Thus it happens that the Raven is made the grandson of Heaven. Many characteristics of the myths referring to heaven have the appearance of having been adapted only with difficulty to the myths of the neighboring tribes, and remind us of people living far to the south-east in the interior.

The myths of the Kwakiutl are very remarkable. They are one people, speaking one language with hardly any dialectic differences; and still the legends of the northern tribes are entirely different from those of the southern tribes, while those of the central ones are still of another character. The only legends that are common to all of them refer to the great religious winter dance. It is doubtful whether the legend of the Great Wanderer, who transformed men into animals, is known to all of them, or whether it is unknown to the most northern tribe, the Qaisla.

Last of all we have to consider the Salish. The great heroes of their myths are the Great Wanderer, whom I mentioned just now, and the sun, many stories referring to whom are told.

In an attempt to inquire into the origin of these legends, we must study the etymologies of mythological names. It is true that the greater number are derived from roots belonging to the language of the tribe who tells the legend. A considerable number, however, are borrowed words, and thus the origin of the legend is indicated. This is, for instance, the case in regard to the mythical figures which occur in the dances of the Kwakiutl. I found the Kwakiutl names used by the Nutka, Salish, Tsimshian, and Haida. This fact seems to indicate that these legends and customs have spread at a comparatively recent date over the coast, and it is a proof that they originated among the Kwakiutl. Another instance of this kind may be observed among the Bilqula. The ancestors of some of their clans have Kwakiutl names. Their word for shaman (*atloqoala*) is a modified form of the Kwakiutl word *tlo-koala*. These facts prove a long and intimate intercourse between both tribes.

It is very difficult to arrive at an understanding of the original myths of the Kwakiutl, as the northern tribes have only very few of the customs and traditions peculiar to the southern tribes. Even their social organization is not the same, matriarchate being peculiar to the northern group, patriarchate to the southern. On account of philological considerations, I think that the social organization of the Kwakiutl was originally patriarchal, or it may be more correct to say that the male and female line had equal rights. This opinion is founded on the fact that even among the tribes among whom matriarchate prevails at present, the same terms are used for denoting relationship in the male and female lines.

We have therefore to inquire how it happened that the northern tribes of this people adopted the matriarchate. Undoubtedly this is due to the influence of some of their neighbors.

A study of the mythologies of the coast shows that among the northern tribes, who have a patriarchal organization, the raven legend occurs in the same form in which we find it among the Tsimshian. It shows the same connection with the sun-myths which it has among the latter. Besides this, the division into gentes of these tribes is similar to that of the Tsimshian, who have four gentes and no phratries, while the Kwakiutl have three gentes and no phratries. The Haida and Tlingit, on the other hand, have numerous gentes, which are arranged in two phratries, — the raven and the eagle. The crests of the Tsimshian are the eagle, raven, wolf, and bear; those of the Kwakiutl, the raven, eagle, and bear. For these reasons it seems that the Tsimshian have modified the customs of the northern Kwakiutl.

There is one important consideration which leads us to the conclusion that the Kwakiutl were never immediately influenced by the Haida. It is the fact that none of their customs are found among the latter, except when carried there by the Tsimshian. Only a few Tsimshian tribes practise all the dances of the Kwakiutl, and it was only in the beginning of this century that the Haida began to borrow them from the Tsimshian. It might seem that the Tsimshian themselves imitated these dances only recently, as they have not spread over the whole people; but it must be borne in mind that the right of performing the dances is acquired only by means of marriage, and that it is watched with great jealousy. It is well known that such prerogatives are frequently preserved for long periods. Nevertheless it appears remarkable that these dances have not spread any further through intermarriage, if the reverse influence of the Tsimshian upon the Kwakiutl was sufficient to modify their social organization entirely.

I am inclined to believe that another custom of the North-West Americans besides their dances originated among the Kwakiutl. I mean the use of heraldic columns. This view may seem unjustified, considering the fact that such columns are made nowhere with greater care than in the northern regions, among the Tsimshian and Haida, and that farther north and south they are less frequent and less elaborately carved. The Haida, however, frequently took up foreign ideas with great energy, and developed them independently. We mentioned above the winter dances, which undoubtedly originated among the Kwakiutl. The use of red cedar-bark is connected with these dances. A glance at the existing collections shows that the Haida have more elaborate and varied forms of rings than any other tribe. This variety leads us to the conclusion that their dances are of similar diversity. It appears that this tribe has a remarkable faculty of adaptation.

This fact is important in considering the history of the use of heraldic columns. The division into gentes has a far greater importance in the life of the Haida than in that of any other tribe of the coast, although the mythologic foundation and the division itself are the same. The gentes and phratries of the Haida and Tlingit are identical; but while the former use hardly any heraldic columns, and do not tattoo themselves to any great extent, the columns of the Haida surpass those of the Tsimshian in size and beauty of workmanship. The faint traces of tattooing found among the Tsimshian are developed among them into an elaborate art; breast, arms, legs, feet, and back being tattooed.

A study of the legends of all these tribes shows that only the traditions of the Kwakiutl frequently allude to heraldic columns. It is true that such tales may originate in the desire to give greater importance to the possessor of such a column; and this is the more probable, as the Kwakiutl are very vain; but I think the columns are mentioned too frequently, and they are too intimately connected with important myths, to allow us to hold this idea.

I turn to considering the Coast Salish tribes. It is well known that tribes of this linguistic stock inhabit the greater part of southern British Columbia and Washington Territory: therefore the tribes of the interior must be considered in our inquiry. The mode of life of the inland divisions of this people is entirely different from that of the coast tribes. The latter live in large houses, which are similar to those of the northern coast tribes except that they are longer. They are fishermen, and use the canoe as extensively as

the Kwakiutl. The tribes of the interior, on the other hand, live in underground houses, and are hunters as well as fishermen. The hero of the Salish myths seems to be the Sun, and legends are found referring to the murder of the old sun and the origin of a new one. I am not equally sure that the legend of the Great Transformer originated among the Salish. On the coast he is undoubtedly considered the deity, but he is of far less importance among the Ntlakapamuq of Thompson River. I do not know whether the legend is known to the Salish of the interior of Washington Territory, but we know that it is known to the Chinook of Columbia River. It is also the foundation of the Nutka mythology.

Patriarchate prevails among the Salish. The division into gentes, however, is not very clear. There exist prerogatives of certain groups of families, particularly regarding the winter dances and the use of masks. The latter is undoubtedly derived from the north, as masks are few, and as it seems that they are not used by the inland tribes.

The study of the use of masks calls our attention to another interesting fact. The masks of the most northern one of these peoples, the Tlingit, have certain remarkable ornaments, representing figures of animals, which are attached to the faces. Beside this, they are not as conventional as those of the southern tribes. The masks of the Eskimo of southern Alaska have the same peculiarities, and this leads us to conclude that a mutual influence existed here. A careful study of the religious ideas of these tribes reveals another fact that strengthens the foregoing conclusion. The Tlingit as well as the Eskimo believe that there are two regions to which the souls go after death: those dying a violent death go to heaven; those dying of sickness go to a lower world, which the Eskimo believe to be under ground, while the Tlingit say that it is outside the world, on the same level with the earth's surface.

I have attempted in the preceding remarks to elucidate a few points regarding the history of North-West American culture. I have shown that it is not uniform, and that it is derived from various sources. Those facts seem to be the most convincing which prove that various tribes belonging to the same linguistic stock have not the same social organization and customs. Unfortunately the available material is not sufficient to complete our inquiry. A knowledge of the tribes of Gardner Channel and of the Salish of the interior, as well as of their southern neighbors, is indispensable in tracing the origin of the legend of the Great Wanderer.

One of the results of our inquiry is the discovery of the deep influence wrought by the Kwakiutl upon the development of their neighbors. It may be that this influence is still more important than it seems at present. The foundation of the mythology of the Kwakiutl tribes is obscure, as they themselves are much influenced by another great group of tribes, — the Tlingit and Haida.

These two tribes will form one of the most interesting objects of further researches. Their languages are very much alike in structure, while their vocabularies show great differences. Their customs and traditions are alike; but the Haida are influenced by their southern neighbors, through their frequent intercourse with the Tsimshian. The fact that the arts of the Tlingit and Haida are not of the same character is important, as it seems to prove that the arts are of foreign origin, but attained their highest stage of development here.

The legends of the Tsimshian favor the theory that they reached the coast much later than the other tribes. The Nutka, finally, are so much influenced by the Kwakiutl, that a study of their customs does not reveal any facts as to their origin.

F. BOAS.

THE increase of population of France is steadily growing less. In the past year the number of births was 899,333; of deaths, 842,797; or 23.5 and 22 per thousand respectively. The excess of births over deaths has decreased since 1881 from 108,229 to 56,536, or 48 per cent. The *Revue Scientifique*, from which we take these figures, comments in a very interesting editorial on the connection of these facts with the question of retrenching immigration into France, which is at present favored by the government and by the people, and shows that the only remedy is to open France to an unrestricted immigration from neighboring countries.

SCIENTIFIC NEWS IN WASHINGTON.

Photographs made on Surfaces Feebly Sensitive to Light: Making Pictures on Printing-Paper and Wood without Previous Preparation of the Surface. — A Town in Florida where they deserve to have Yellow-Fever: Dr. Posey's Report on the Sanitary Condition of Macclenny. — Do we carry an Electric Battery within us? — Floating Wrecks a Source of Great Danger to Ocean Navigation: The International Marine Conference to discuss the Subject. — The "King Devil." — How to see Insects and Plant-Roots under Ground.

Surfaces Feebly Sensitive to Light.

SOME interesting experiments have recently been made by Mr. J. W. Osborn of Washington, on the sensitiveness of different surfaces to light, the results of which he has described in a paper, of which the following is an abstract:—

"In thinking and speaking of substances sensitive to light," says Mr. Osborn, "photographers and others are apt to remember only the haloid salts of silver; chromic acid, under restraint, acting on organic matter; asphaltum, and a few salts of iron and platinum; which short catalogue does, in fact, include all the sensitive bodies used in practical photography." But, as every one knows, this list may be indefinitely extended (if the degree of sensitiveness be disregarded), and Mr. Osborn has prepared a number of specimens to show such extension in certain directions. Broadly, he says, the results should not be regarded as new, though in the manner of their preparation and presentation some novelty may be claimed for them.

Three specimens were prepared to show colored commercial paper which had been bleached by light, and which give, therefore, a negative when exposed under a negative. On other sheets exposed, papers colored for the purpose with eocine and methyl violet are shown, and they establish the fact that these colors, under the luminous influence, give rise to colorless compounds.

"The duration of the exposures required to produce these photographic effects," says Mr. Osborn, "is very considerable when the change is carried to its maximum; varying from twenty to thirty-five or forty hours in direct sunlight, which is the only kind of exposure employed in the experiments. Indications of photo-chemical action are, however, visible in much less time. A piece of eocine paper exposed under two strips of black lace showed a faint positive after half an hour; also a piece of methyl violet paper, similarly exposed, showed gradually increasing strength of the positive after one, two, and three hours.

"The fact that printing and writing papers become brown by age is familiar to most persons; but that this change is essentially photographic is not a common belief. Pieces of newspaper were taken from the *New York Tribune*, *Baltimore Sun*, and *Washington Evening Star*, and photographic images were impressed upon them by simple exposure under a dense negative. These papers were subjected to no preparatory treatment, establishing the fact that the newspapers we read daily are printed on papers sensitive to light, and adapted for the production of positive pictures.

"Pieces of white pine wood of different qualities were prepared, upon which photographs were produced by exposures under stencil negatives made by cutting openings in tinfoil and pressing it into close contact with the surface of the wood by means of a plate of glass properly clamped thereto. The exposure required to produce these photographic images varies from thirty to fifty or sixty hours. On a piece of poplar the picture was produced in twenty hours; for it seems probable, that, of all the woods in common use, poplar is the most sensitive, and gives the darkest color when fully exposed. It seems probable that the darkening of wood, which is very commonly though rather vaguely attributed to the action of the air, is related to the photographic effect obtainable on printing-papers. These are now hardly to be had without an admixture of wood-pulp; and the present inquiry, inasmuch as it proves the phenomena to be strictly photographic, may have a practical bearing if it points to means which will keep printing-papers white indefinitely."

The bleaching action of light upon a dried leaf is shown by one specimen; and by another, the fact that a piece of parchment, though substantially white, becomes a little whiter where the light has acted. As far as it goes, this would tend to show that the "yellowing of parchments by age" is not a photo-chemical process. The parchment had a very long exposure.